The present invention pertains to a resolver that is used to detect the speed and position of a servomotor in the fields of factory automation equipment and office automation apparatuses, wherein the resolver can be downsized without resulting in a lowering of the detection voltage, and it is possible to limit the variation in amplitude of flux linkage even if axial misalignment occurs when attaching a sheet coil. Furthermore, the invention may be applicable in providing of an inexpensive resolver using a sheet coil, which has only a small angular error.

What is claimed is:

1. A resolver including a disk-shaped rotor and two disk-shaped stators between which said rotor is placed with air gaps in the axial direction thereof, wherein said rotor is such that a rotor side sheet coil is attached to both sides of a disk-shaped soft magnetic material on which are formed a secondary side pattern of a rotary transformer and a resolver excitation phase pattern, and a stator side sheet coil having a rotary transformer primary side pattern formed on a disk-shaped soft magnetic material is attached to one of said stators opposed to said rotary transformer secondary pattern, and a stator side sheet

coil having a resolver detection phase pattern formed on a disk-shaped soft magnetic material is attached to the other of said stators opposed to said resolver excitation phase pattern.

2. The resolver using a sheet coil as set forth in Claim 1, wherein the rotor side sheet coil is formed of a single sheet composed of a disk having said resolver excitation phase pattern formed, a disk having said rotary transformer secondary side pattern formed, and a linear portion having a cross-over line that connects said resolver excitation phase pattern and said rotary transformer secondary side pattern to each other.

3. The resolver using a sheet coil as set forth in Claim 1, wherein said stator side sheet coil is formed of a single sheet composed of a disk having said resolver detection phase pattern formed, a disk having said rotary transformer primary side pattern formed, and a linear portion that links the corresponding two disks with each other.

4. The resolver using a sheet coil as set forth in Claim 1 or 2, wherein said rotary transformer secondary side pattern formed on both sides of the disk according to the invention is a pattern eddying from outside to inside, and both the patterns are connected to each other in series, and said resolver excitation phase pattern that is formed at both sides of the

disk is a pattern eddying by 2N times in the circumferential direction where N is a natural number, and the center of the eddy on the surface side is disposed at the same position of the eddy on the rear side in the circumferential direction, and 4N eddies are connected to each other in series, wherein the axial multiple angle is NX.

5. The resolver using a sheet coil as set forth in Claim 1 or 3, wherein said rotary transformer primary side pattern is formed on both sides of the disk, and both patterns eddying from outside to inside are connected to each other in series, and said resolver detection phase pattern is formed on both sides of the disk, and one side of which is an "α" phase and the other of which is a "β" phase, wherein 2N patterns eddying in the circumferential direction are disposed, and the center positions of the eddies of the "α" phase and "β" phase slip by $90/N°$ from each other in the circumferential direction, and

2N eddies are connected to each other in series to cause the axial multiple angle to become NX.

Sub A6 6. The resolver using a sheet coil as set forth in any one of Claims 1 through 5, wherein one of either the outer diameter of said rotary transformer secondary side pattern or that of said rotary transformer primary side pattern is made larger than the other thereof.

Sub a17

7. The resolver using a sheet coil as set forth in any one of Claims 1 through 6, wherein the radius r_2 of the extremely outer conductor of said rotary transformer secondary side pattern and radius r_1 of the extremely outer conductor of said rotary transformer primary side pattern is established so as $0 < r_2 - r_1 \leqq 4 \times \lambda_2$ or $0 < r_1 - r_2 \leqq 4 \times \lambda_1$ where the pattern pitch of the rotary transformer secondary side pattern is λ_2 and the pattern pitch of the rotary transformer primary side pattern is λ_1.

8. The resolver using a sheet coil as set forth in any one of Claims 1 through 5, wherein the outer diameter of said resolver excitation phase pattern is made larger than the outer diameter of the resolver detection phase pattern while the inner diameter of the resolver excitation phase pattern is made smaller than the inner diameter of the resolver detection phase pattern, or the outer diameter of the above-described detection phase pattern is made larger than the outer diameter of the above-described excitation phase pattern while the inner diameter of the detection phase pattern is made smaller than the inner diameter of the excitation phase pattern.

9. The resolver using a sheet coil as set forth in any one of Claims 1, 2, 3, 4, 5 and 8, wherein, where the pattern pitch

SubA17 of the resolver excitation phase pattern is λ_θ, and the pattern pitch of the resolver detection phase pattern is λ_α, the radius $r_{\theta o}$ of the extremely outer conductor of the resolver excitation phase pattern and the radius $r_{\alpha o}$ of the extremely outer conductor of the rotary transformer primary side pattern, or the radius $r_{\theta I}$ of the extremely inner conductor of the resolver excitation phase pattern and the radius $r_{\alpha i}$ of the extremely inner conductor of the rotary transformer primary side pattern are established so as to become

$$0 < r_{\alpha o} - r_{\theta o} \leqq 4 \times \lambda_\alpha$$

and

$$0 < r_{\theta i} - r_{\alpha i} \leqq 4 \times \lambda_\alpha$$

or

$$0 < r_{\theta o} - r_{\alpha o} \leqq 4 \times \lambda_\theta$$

and

$$0 < r_{\alpha i} - r_{\theta i} \leqq 4 \times \lambda_\theta .$$